

Appl. No. 10/690,070  
Amdt. dated September 9, 2005  
Reply to Office action of June 14, 2005

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

5      **Listing of Claims:**

Claim 1 (Currently Amended): A coated substrate comprising:  
a substrate;

a coating disposed on the substrate, wherein the coating comprises a self-assembled film having at least one bilayer, wherein each bilayer comprises a polyanion  
10 electrolyte layer and a polycation electrolyte layer, wherein an uppermost layer is a compound comprising a fluoroalkyl group; and

wherein each bilayer thickness ranges from about 0.1 nanometers to about 20 nanometers and wherein the coating absorbs less than 1% of transmitted light between wavelengths of about 300 nanometers to about 3000 nanometers.

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Claim 2.      (Original): A coated substrate according to claim 1, wherein the substrate is an inorganic substrate selected from the group consisting of: silica glass, quartz glass, sapphire, ruby, spinel ceramic glass, yttrium silver, optical high-lead glass, cubic zirconia, a reflecting material, and a high index optical quality glass.

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Claim 3.      (Original): A coated substrate according to claim 1, wherein the substrate is silica glass.

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Claim 4.      (Original): A coated substrate according to claim 1, wherein the substrate is an organic substrate selected from the group consisting of: polyester, polycarbonate, polyacrylate, poly(methyl methacrylate), polyamide, and polystyrene.

Claim 5.      (Original): A coated substrate according to claim 4, wherein the substrate is polycarbonate.

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Claim 6. (Original): A coated substrate according to claim 4, wherein the substrate is polyester.

5 Claim 7. (Original): A coated substrate according to claim 4, wherein the substrate is polyacrylate.

Claim 8. (Original): A coated substrate according to claim 1, wherein the substrate is an optical substrate.

10 Claim 9. (Original): A coated substrate according to claim 8, wherein the optical substrate is either transparent or reflecting.

Claim 10. (Original): A coated substrate according to claim 9, wherein the optical substrate is transparent.

15 Claim 11. (Original): A coated substrate according to claim 1, wherein the substrate has a shape selected from the group consisting of: curved, flat, cylindrical, conical, and spherical.

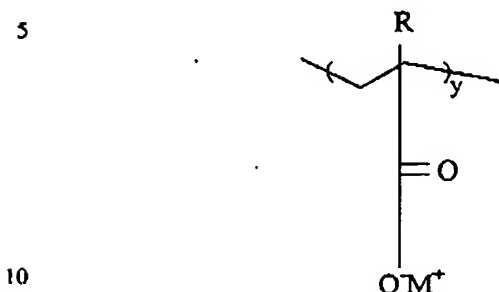
20 Claim 12. (Original): A coated substrate according to claim 11, wherein the substrate has a curved shape.

Claim 13. (Original): A coated substrate according to claim 11, wherein the substrate has a flat shape.

25 Claim 14. (Original): A coated substrate according to claim 1, wherein the polyanion electrolyte comprises a poly(acrylic acid) polyelectrolyte.

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Claim 15. (Original): A coated substrate according to claim 14, wherein the poly(acrylic acid) polyelectrolyte has the structure:



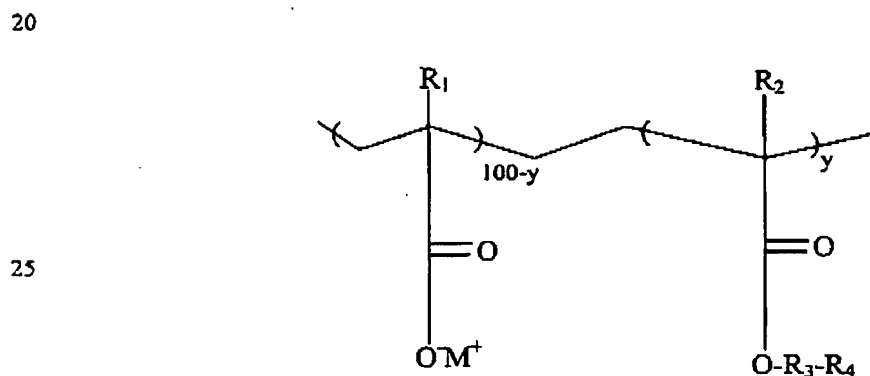
where:  $y = 1$  to 200,000;

M is selected from the group consisting of: H, Li, Na and K; and

R is selected from the group consisting of: hydrogen, methyl or ethyl.

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Claim 16. (Currently Amended): A coated substrate according to claim 14, wherein the poly(acrylic acid) polyelectrolyte is a fluorocarbon-modified poly(acrylic acid) having the structure:



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where:

$y = 0.1$  to 90 mole percent;

M is selected from the group consisting of: H, Li, Na, and K;

5  $R_1$  is selected from the group consisting of: H,  $CH_3$ , and  $CH_3CH_2-$ ;

$R_2$  is selected from the group consisting of: H,  $CH_3$ , and  $CH_3CH_2-$ ;

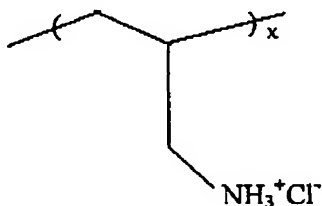
$R_3$  is selected from the group consisting of:  $-(CH_2CH_2-O)_x$  where  $x = 1$  to 20;

$R_4$  is selected from the group consisting of:  $-(CF_2)_n CF_3$  where  $n = 1$  to 50.

10 Claim 17. (Original): A coated substrate according to claim 1, wherein the polycation electrolyte comprises a poly(allylamine hydrochloride) polycation.

Claim 18. (Original): A coated substrate according to claim 17, wherein the poly(allylamine hydrochloride) polycation has the structure:

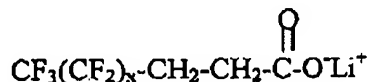
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where  $x = 1$  to 200,000.

25 Claim 19. (Original): A coated substrate according to claim 1, wherein the fluoroalkyl group has the structure:



where  $x = 0$  to 50.

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Claim 20. (Original): A coated substrate according to claim 1, wherein the polycation is a fluorinated polycation.

Claim 21. (Original): A coated substrate according to claim 1, wherein the polyanion is a fluorinated polyanion.

Claim 22. (Original): A coated substrate according to claim 1, wherein the coating comprises a plurality of bilayers and the coating has a thickness of about 0.1 nanometers to about 200 nanometers.

Claim 23. (Original): A coated substrate according to claim 22, wherein the coating has a thickness of about 1 nanometer to about 10 nanometers.

Claim 24. (Canceled)

Claim 25. (Currently Amended): A coated substrate prepared by:

- a) providing a substrate;
- b) applying a first electrolyte layer to the substrate;
- c) applying a second electrolyte layer to the first electrolyte layer and allowing the second electrolyte layer to react with the first electrolyte layer to form a bilayer;
- d) applying a compound comprising a fluoroalkyl group to the bilayer to form a coating on the substrate, wherein the coating absorbs less than 1% of transmitted light between lengths of about 300 nanometers to about 3000 nanometers.

Claim 26. (Original): A coated substrate according to claim 25, wherein the steps of applying a second electrolyte layer to the first electrolyte layer are repeated a plurality of times to form a coating having a thickness ranging from about 0.1 nanometers to about 200 nanometers.

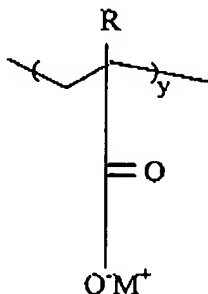
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**Claim 27. (Original):** A coated substrate according to claim 25, wherein the first electrolyte layer is a polyanion electrolyte layer and wherein the second electrolyte layer is a polycation electrolyte layer.

5      **Claim 28.**      (Original): A coated substrate according to claim 25, wherein the first electrolyte layer is a polycation electrolyte layer and the second electrolyte layer is a polyanion electrolyte layer.

Claim 29. (Original): A coated substrate according to claim 27, wherein the  
10 polyanion electrolyte layer comprises a poly(acrylic acid) polyelectrolyte.

Claim 30. (Original): A coated substrate according to claim 29, wherein the poly(acrylic acid) polyelectrolyte has the structure:



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where:  $y = 1$  to 200,000;

M is selected from the group consisting of: H, Li, Na and K; and

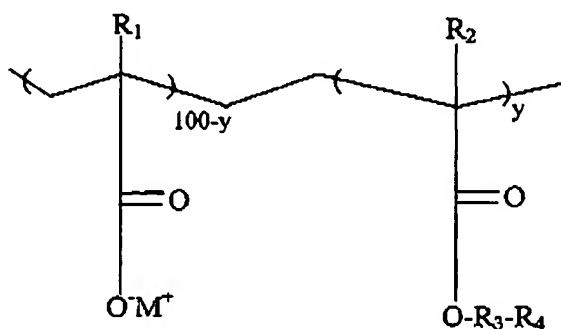
25 R is selected from the group consisting of: H, CH<sub>3</sub>-, and CH<sub>3</sub>CH<sub>2</sub>-.

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Claim 31. (Original): A coated substrate according to claim 29, wherein the poly(acrylic acid) polyelectrolyte is a fluorocarbon-modified poly(acrylic acid) having the structure:

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where:

$y = 0.1$  to 90 mole percent;

M is selected from the group consisting of: H, Li, Na, and K;

$R_1$  is selected from the group consisting of: H,  $\text{CH}_3$ , and  $\text{CH}_3\text{CH}_2$ ;

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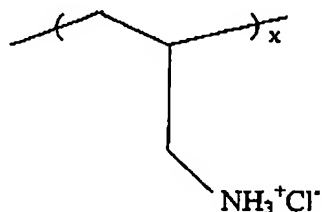
$R_2$  is selected from the group consisting of: H,  $\text{CH}_3$ , and  $\text{CH}_3\text{CH}_2$ ;

$R_3$  is selected from the group consisting of:  $-(\text{CH}_2\text{CH}_2\text{-O})_x$  where  $x = 1$  to 20;

$R_4$  is selected from the group consisting of:  $-(\text{CF}_2)_n\text{CF}_3$  where  $n = 1$  to 50.

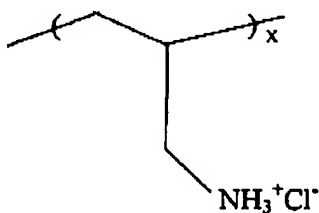
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Claim 32. (Original): A coated substrate according to claim 27, wherein the poly(allylamine hydrochloride) polycation has the structure:



10 where  $x = 1$  to 200,000.

Claim 33. (Original): A coated substrate according to claim 28, wherein the poly(allylamine hydrochloride) polycation has the structure:



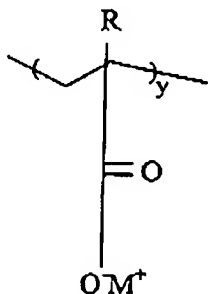
20 where  $x = 1$  to 200,000.

Claim 34. (Original): A coated substrate according to claim 28, wherein the polyanion electrolyte layer comprises a poly(acrylic acid) polyelectrolyte.



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Claim 35. (Original): A coated substrate according to claim 34, wherein the poly(acrylic acid) polyelectrolyte has the structure:

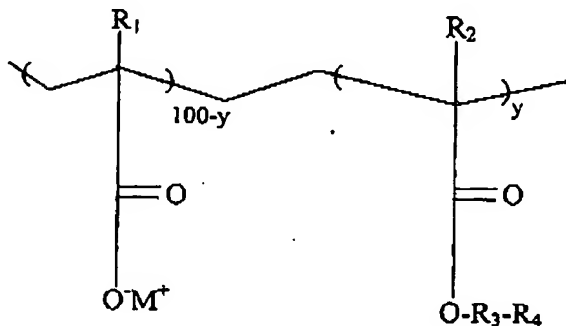


where:  $y = 1$  to 200,000;

M is selected from the group consisting of: H, Li, Na and K; and

R is selected from the group consisting of: H,  $\text{CH}_3$ -, and  $\text{CH}_3\text{CH}_2$ -.

Claim 36. (Original): A coated substrate according to claim 34, wherein the poly(acrylic acid) polyelectrolyte is a fluorocarbon-modified poly(acrylic acid) having the structure:



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where:

y = 0.1 to 90 mole percent;

M is selected from the group consisting of: H, Li, Na, and K;

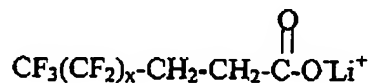
5 R<sub>1</sub> is selected from the group consisting of: H, CH<sub>3</sub>, and CH<sub>3</sub>CH<sub>2</sub>-;

R<sub>2</sub> is selected from the group consisting of: H, CH<sub>3</sub>, and CH<sub>3</sub>CH<sub>2</sub>-;

R<sub>3</sub> is selected from the group consisting of: -(CH<sub>2</sub>CH<sub>2</sub>-O)<sub>x</sub> where x = 1 to 20;

R<sub>4</sub> is selected from the group consisting of: -(CF<sub>2</sub>)<sub>n</sub> CF<sub>3</sub> where n = 1 to 50.

10 Claim 37. (Original): A coated substrate according to claim 25, wherein the fluoroalkyl group has the structure:



15 where x = 0 to 50.

Claim 38. (Original): A coated substrate according to claim 27, wherein the polyanion electrolyte layer comprises a fluorinated polyanion.

20 Claim 39. (Original): A coated substrate according to claim 27, wherein the polycation electrolyte layer comprises a fluorinated polycation.

Claim 40. (Original): A coated substrate according to claim 39, wherein the polyanion electrolyte layer comprises a fluorinated polyanion.

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Claim 41. (Original): A coated substrate according to claim 25, wherein the polyanion electrolyte layer comprises a fluorinated polyanion.

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Claim 42. (Original): A coated substrate according to claim 25, wherein the polycation electrolyte layer comprises a fluorinated polycation.

5 Claim 43. (Original): A coated substrate according to claim 42, wherein the polyanion electrolyte layer comprises a fluorinated polyanion.

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